

A KEY TO FLORIDA'S FRESH-WATER SPONGES, WITH DESCRIPTIVE NOTES¹

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At the twelfth annual meeting of the Florida Academy of Sciences, the writer presented a paper entitled *Fresh-Water Sponges New to Florida*. The sponges new to Florida are the following: *Spongilla aspinosa*, *Heteromeyenia repens*, *Heteromeyenia argyrosperma*, *Dosilia palmeri* and *Trochospongilla horrida*. In addition, new Florida county records were reported for *Heteromeyenia ryderi*, *Trochospongilla pennsylvanica*, *Spongilla ingloviformis*, *Spongilla lacustris*, *Spongilla fragilis*, *Meyenia crateriformis*, *Meyenia millsii*, *Meyenia fluviatilis* and *Meyenia subdivisa*.

For a period of nearly four years, the writer has been studying fresh-water sponges, particularly those from Northern Florida. Over a thousand specimens have been examined, representing collections from nearly three hundred different localities. Many sponges have been found whose taxonomic affiliations are, as yet, uncertain, but the majority of fresh-water sponges found in this state can easily be assigned to their correct genera with the aid of the simple key presented below.

All known fresh-water sponges belong to one family, Spongillidae. About fifteen genera and one hundred and sixty species are known. Nearly one quarter of these have already been found in the United States. These animals live in many kinds of water, and grow on all sorts of supports. Floating and submerged logs are excellent places on which to look for them. In rapid currents they can often be found growing on posts or rocks, usually on the under or downstream sides. In Florida, the optimum habitats seem to be in slow moving and still waters. Lakes, ponds, sink-holes, roadside ditches, swamps and most streams support a great variety of sponge life. Depending on the environment, sponges assume almost any color, from almost clear or white, in clear water, to black or dark brown in water full of decomposing vegetation. Often they are green, this color imparted by certain algae growing between the sponge cells. Colony morphology also varies with the environment. Sponges may have long projections growing from

¹ Contribution from the Department of Biology, University of Florida.

them, or grow in the form of mats or very thin encrustations. Usually they are found in patches an inch or two across, but they range in size from extremely small patches (size of a pin head) to large masses covering an area exceeding a square foot. The sponge colonies are easily cut off their support with a knife, but in doing so it is important to remove the base of the sponge, usually containing gemmules, and unless the entire colony is taken, gemmules may be missed. Gemmules are small, spheroidal or concave, asexual reproductive bodies. Identification of most fresh-water sponges cannot be made without gemmules. After collection, specimens are allowed to dry, and then can be kept in small paper envelopes, boxes or jars and preserved indefinitely.

Identification of sponges is based almost entirely on spicule morphology and arrangement. Spicules must be prepared for microscopic observation before final identification of a sponge is possible. The microscopic, needle-like, siliceous spicules are held together by spongin. This must be removed by heating the sponge in concentrated nitric acid until the organic tissues have entirely disintegrated. The spicules, in the test tube with the dissolved sponge, are washed with water, shaken and allowed to settle, or settled by centrifuging. Washing is continued until the water is relatively clear. Ethyl alcohol is finally added and some of the alcoholic spicule suspension is transferred by a pipette to a cover slip and ignited. After all the alcohol has been burned off, the cover slip is mounted with clarite, balsam, or Damar on a glass slide. Gemmules are treated with nitric acid until they become nearly clear. They are washed, dehydrated by passing up an alcohol series, cleared in carbol-xylol and mounted. A slide of a thin cross section of the sponge is often desirable for observing the structure of the sponge and the exact location of the gemmules.

In studying sponges, it must always be remembered that they are exceedingly variable, even the spicules. Nevertheless, all spicules can be grouped among several categories. Spicules are either megascleres or microscleres. The megascleres are relatively large, needle-like spicules that are supportive in function. Microscleres are of two types: those associated with the gemmule's crust (gemmule spicules) and those found throughout the sponge tissue or often concentrated in the dermal film. In Spongillidae, the skeletal spicules (megascleres) are long, with both ends alike. They grow in both

directions from a central point and are called diactines. They are either smooth or spiny, sharply pointed at each end (oxeas) or rounded (strongyles). Gemmule spicules are generally diactines or birotulates (amphidisks). A birotulate spicule is spool-like, consisting of two terminal disks (rotules) connected by a central shaft. Dermal (flesh) spicules are usually diactines, often similar to skeletal spicules except very much smaller, and usually spiny.

KEY TO GENERA OF FLORIDA SPONGILLIDAE
(Based on gemmule and spicule characters.)

1. Gemmules without long filamentous projections.
 2. Spicules *all* diactines (spiny or smooth). (I) *Spongilla*
 - 2'. Birotulate spicules present, as well as diactines.
 3. Edges of terminal disks (rotules) of birotulates serrated.
 4. Only one type of birotulate.
 5. Dermal spicules lacking. (II) *Meyenia*
 - 5'. Dermal spicules stellate, or imperfectly so.
(III) *Dosilia*
 - 4'. Two distinct classes of birotulate spicules.
 6. Dermal spicules, *if present*, diactinal and spiny.
..... (IV) *Heteromeyenia*
 - 6'. Dermal spicules stellate, *always* present. Shafts
of long birotulates nearly smooth, straight, slender (V) *Asteromeyenia*
 - 3'. Edges of terminal disks smooth (VI) *Trochospongilla*
 - 1'. Gemmules with long filamentous projections (VII) *Carterius*

(I) *Spongilla* LAMMARCK.

Spicules all diactinal.² Skeletal spicules long, with pointed or rounded ends. Minute diactinal dermal spicules often present.

DESCRIPTION OF FLORIDA SPECIES

Spongilla lacustris (Linnaeus)—Plate 1, Fig. 1. Skeletal spicules smooth and long. Minute spiny dermal spicules. Gemmules surrounded by spiny, curved diactines. Living sponge often green. Common in moderately clear lakes, ponds and streams. Florida county records: Alachua, Bradford, Gilchrist, Jackson, Levy, Putnam, Volusia.

Spongilla wagneri Potts. Like *S. lacustris*, except dermal spicules longer, and skeletal spicules sometimes microspined. Probably this species is merely a phase of *S. lacustris*. Florida records: only in type locality, in Lostman's

² Minute dermal birotulates are found in *S. novae-terrae*, known only from Newfoundland.

River, southwest Florida. Collected in brackish water.

Spongilla aspinosa. Potts. All spicules entirely smooth. Small dermals present, as well as small amorphous spicules. Living sponge usually green. Gemmules sparse. Found in cypress swamps with moderately clear, standing water. Florida county records: Alachua, Columbia, Gilchrist, Volusia.

Spongilla fragilis. Leidy. Skeletal spicules smooth. Gemmule spicules are diactines, generally slightly curved, and always entirely spined; usually strongyles, but sometimes oxeads appear. Spines often more numerous at ends. Variations common. Dermal spicules absent. Gemmules formed in compact groups, often in one or more basal layers. Common in swamps, swamp streams and sink-holes. Florida county records: Alachua, Clay, Columbia, Dixie, Levy, Marion, Taylor.

Spongilla ingloviformis Potts.—Plate I, Fig. 2. Skeletal spicules slender with coarse spines; spines especially concentrated near the end; like gemmule spicules but not as heavily spined and longer. Gemmule spicules heavily and coarsely spined diactines; nearly as long as skeletal spicules. Dermal absent. Color variable; colonies thin, forming flat, wide spreading patches. Gemmules formed in compact groups of six to twelve or fifteen, surrounded by parenchyma containing numerous gemmule spicules. Prefers acid swamps and roadside ditches connecting swamps. Florida county records: Alachua, Columbia, Dixie, Gilchrist, Levy, Marion, Pasco, Taylor, Volusia.

(II) *Meyenia* CARTER

The more common name of this genus, *Ephydatia*, has been replaced (de Laubenfels *A Discussion of the Sponge Fauna of the Dry Tortugas*, Carnegie Institution of Washington Publication No. 467, 1936, pg. 37) by the original name, *Meyenia*.

Gemmule spicules are all birotulates that are more-or-less uniform in length but not of two different classes. Rotules have serrate edges, deeply or finely cut. No dermal spicules.

DESCRIPTION OF FLORIDA SPECIES

Meyenia fluviatilis fluviatilis...Carter. Skeletal spicules robust diactines, nearly always entirely smooth. Gemmule spicules birotulates; rotules coarsely and irregularly dentate; shafts variable in length, but longer than rotule diameter. Shafts of birotulates smooth or with several coarse spines. Colonies usually large, forming circular patches; color variable. Usually found in large flatwoods swamps, or in swamp pools bordering large streams. Florida county records: Alachua, Lake, Levy, Putnam, Sarasota.

Plate I

Fig. 1. *Spongilla lacustris*.—a, skeletal spicule; b, gemmule spicule; c, dermal spicule.

Fig. 2. *Spongilla ingloviformis*.—a, skeletal spicule; b, gemmule (or parenchymal) spicule.

Fig. 3. *Meyenia crateriformis*.—a, skeletal spicule; b, gemmule spicule.

Fig. 4. *Meyenia millsii*.—a, skeletal spicule; b, gemmule spicules, side and top views.

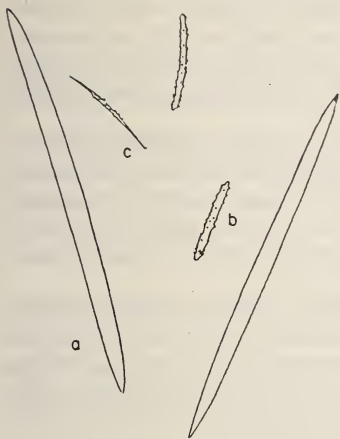


Fig 1

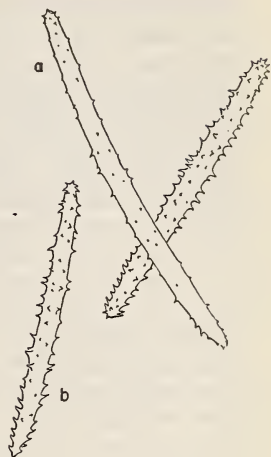


Fig 2

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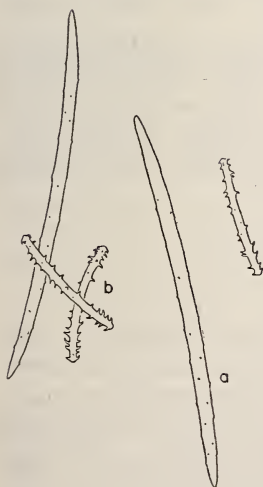


Fig. 3

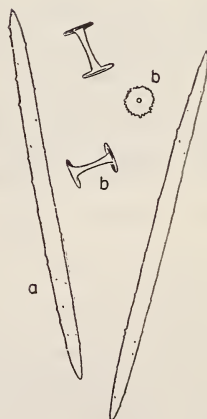


Fig. 4

Meyenia fluviatilis gracilis Carter. Skeletal spicules slender delicate diactines, most of them curved. Gemmule spicules birotulates with extremely slender, long, smooth, curved shafts; rotules very small and flat and serrated. Living sponge is often thin, small, delicate and nearly transparent, usually greyish-white with white gemmules. Lives in clear standing water. Florida county records: Alachua, Marion, Volusia.

Meyenia subdivisa Potts. Skeletal spicules are smooth (sometimes slightly microspined) and sharply pointed. Gemmule spicules are robust birotulates with shafts about as long as diameter of rotule; shafts smooth or possessing several long, usually medial, spines. Rotules are divided into long serrated rays. Sponge often forms large, firm, circular patches. Florida county records: Alachua, Lake, Putnam, Sarasota.

Meyenia crateriformis Potts—Plate I, Fig. 3. Skeletal spicules slender, microspined. Gemmule spicules modified birotulates with long cylindrical shafts. Shafts particularly spiny at ends, sometimes sparsely so near middle; rotules very small, often convex, bearing several short, recurved hooks. The specimen shown in figure 3 is atypical yet others like it are relatively common in Florida. The more typical gemmule spicules have fewer spines on their shafts, and slightly larger rotules. The living sponge is very thin, encrusting, fiat, spreading; usually grey, nearly transparent. White gemmules often very numerous. Occupies a number of different habitats, but is the only species likely to be found in very stagnant or turbid water. Florida county records: Alachua, Columbia, Lake, Levy, Marion, Taylor.

Meyenia subtilis (Weltner). Skeletal spicules slender, microspined. Gemmule spicules delicate birotulates; slender with smooth, long shafts. Rotules deeply dentate, with rounded rays. Known only from type locality in Kissimmee Lake, Osceola County, Florida.

Meyenia millsii Potts—Plate I, Fig 4. Skeletal spicules slender, microspined. Gemmule spicules are birotulates; rotules finely serrate with flat surfaces, often microspined. Shafts smooth or possessing several small spines. Shaft length usually longer than diameter of rotule, but variable in this respect. Fairly common in cypress, pine and gum swamps. Florida county records: Alachua, Bradford, Columbia, Gilchrist, Levy, Volusia.

(III) *Dosilia palmeri* (POTTS)

Plate II, Fig. 5

This is the only known member of the genus *Dosilia* in North America. My specimen of this sponge is the only one known from Florida, and is identical with Potts' *Meyenia plumosa* var. *palmeri*, in the Academy of Natural Sciences of Philadelphia. Annandale, 1911, considered Potts' specimen as a species distinct from *Dosilia plumosa* (Carter) 1849, collected in Bombay, India. I am accepting Annandale's distinction as a valid one, and am considering the North American *Dosilia* as species *palmeri*.

D. palmeri is characterized by microspined, robust, skeletal spicules, and birotulate gemmule spicules with very spiny shafts, and with outwardly convex, laciniated rotules, possessing some recurved hooks. Dermal spicules fairly abundant; substellate or acerate with long divergent branches. Amorphous, irregularly rayed spicules can sometimes be found. Living sponges form large, spreading, green colonies. Gemmules large, white, abundant. In Florida, known only from a large waterfilled sink-hole one mile southeast of Williston, Levy County.

(IV) *Heteromeyenya* Potts.

Gemmules possessing birotulate spicules of two distinct classes: long and short. Margins of rotules always incised or dentate. The short birotulates are most numerous. Long birotulates have recurved hooks or spines on their rotules.

DESCRIPTION OF FLORIDA SPECIES.

Heteromeyenya ryderi Potts—Plate II, Fig. 6. Skeletal spicules long, pointed at ends; usually sparsely but sometimes very densely spined, except near ends. Gemmule spicules of two types or classes:

- 1) Short birotulates—shafts smooth or with several coarse spines near middle; margins of rotules finely serrate; diameter of rotule usually nearly equal to length of shaft.
- 2) Long birotulates—shafts coarsely spined; rotules small, consisting of short, recurved hooks or spines.

Dermal spicules absent. Living sponge is usually moderately large, forming irregular, conspicuous colonies, sometimes nearly an inch thick; colonies often hemispherical; usually light grey or brown in color. This appears to be the most common sponge in Florida, and grows in almost all fresh-water environments; but reaches maximum development, in number and size, in cypress swamps and adjoining ditches. Florida county records: Alachua, Citrus, Clay, Columbia, Dixie, Gilchrist, Jackson, Jefferson, Lake, Levy, Marion, Osceola, Pasco, Putnam, St. Johns, Taylor, Volusia.

Heteromeyenya repens Potts. Skeletal spicules slender, microspined, tapering at ends. Gemmule birotulates of two classes:

- 1) Short—numerous; sometimes almost as long as those of long class; shafts usually smooth; rotules bearing rays, though less prominent than those on long birotulates.
- 2) Long—less numerous than shorter ones; shafts smooth or with several coarse spines. Rotules with incurved, hook-like rays.

Dermal spicules usually straight and spined, with longest spines at center. Sponge flat, spreading, usually green, with a few large white, basilar gemmules. Florida county records: Alachua, Marion, Taylor. This sponge probably has a wider distribution in Florida, since I have found immature sponges resembling this species as well as scattered gemmule spicules in other spicule slides.

Heteromeyenia argyrosperma Potts—Plate II, Fig. 7. Skeletal spicules usually slender and sparsely spined. Gemmule spicules birotulates of two classes:

- 1) Short—smaller than long birotulates and shafts densely spined. Rays of rotules similar in both classes.
- 2) Long—shafts with several coarse spines. Rotules composed of three or four (seldom more) recurved, stout rays.

No dermal spicules. Living sponges usually small, soft, greenish, with several large, scattered, white or light yellow gemmules. Found in several small ponds and sink-holes in Alachua County.

(V) *Asteromeyenia* ANNANDALE.

Birotulate gemmule spicules of two distinct classes; demal spicules in form of asters.

DESCRIPTION OF FLORIDA SPECIES.

Asteromeyenia plumosa (Weltner). Skeletal spicules long, smooth, tapering to sharp ends. Gemmule spicules birotulates of two classes:

- 1) Short—densely and irregularly spined, robust shafts; rotules flat or somewhat convex, with coarsely, irregularly dentate, margins.
- 2) Long—slender shafts, usually smooth, variable in length; rotules with margins divided into slightly recurved rays, not all of equal length.

Dermal spicules small, devoid of spines, stellate, consisting of several projections of unequal lengths radiating from a central nodule. In Florida, known only from the Everglades, exact locality uncertain.

(VI) *Trochospongilla* VEJDovsky

Rotules of birotulates with smooth margins. One rotule may be very much larger than the other.

DESCRIPTION OF FLORIDA SPECIES.

Trochospongilla pennsylvanica (Potts)—Plate II, Fig. 8. Skeletal spicules short, entirely and abundantly spined. Gemmule spicules small birotulates with very unequal rotules, one usually reduced to a mere enlargement on the distal end of the shaft. Rim of the large rotule smooth; shaft slender. Gemmule spicules look like small collar buttons. Sponge usually forms thin, encrusting, elongate, white, grey or green colonies; often glistens when dry.

Plate II

Fig. 5. *Dosilia palmeri*.—a, skeletal spicule with axial canal; b, gemmule spicules, side and top views; c, substellate dermal spicule.

Fig. 6. *Heteromeyenia ryderi*.—a, skeletal spicule; b, gemmule spicules of shorter class, side and top views; b', gemmule spicule of longer class.

Fig. 7. *Heteromeyenia argyrosperma*.—a, skeletal spicule; b, gemmule spicule of shorter class; b', gemmule spicule of longer class.

Fig. 8. *Trochospongilla pennsylvanica*.—a, skeletal spicule with axial canal; b, gemmule spicules, side and top views.

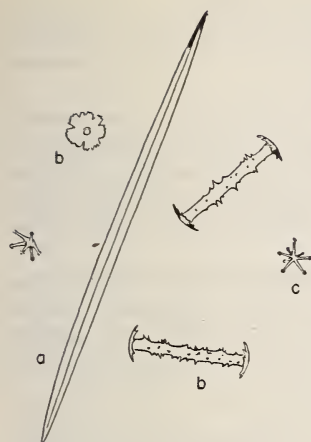


Fig 5

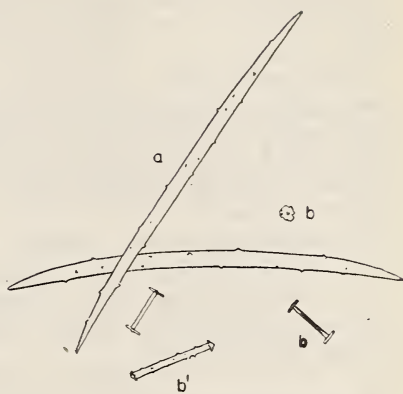


Fig 6

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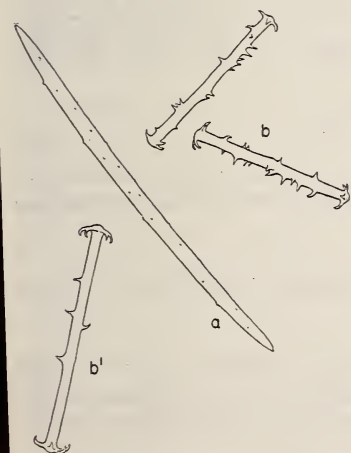


Fig 7

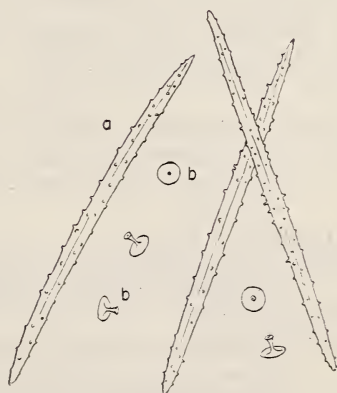


Fig 8

Gemmules usually numerous; yellow or brown in color, with a concavity surrounding foramen. Florida county records: Alachua, Bradford, Clay, Columbia, Dixie, Gilchrist, Jackson, Jefferson, Levy, Marion, Pasco, St. Johns, Sumter, Taylor, Volusia.

Trochospongilla leidy (Bowerbank). Skeletal spicules thick, short, smooth; ends nearly rounded. Gemmule spicules birotulate of one class; shafts short, thick, entirely and always smooth; rotules with smooth margins, sometimes with undulating surfaces. Both rotules equal in size. Living sponge is compact and encrusting. Florida county records: Alachua, Marion. Also known from Everglades.

Trochospongilla horrida (Weltner). Skeletal spicules heavily spined. Gemmule spicules like those of *T. leidy*: short, smooth, stout shafts; entirely smooth margined, equal rotules. Living sponge is small, white, thin, encrusting. Only specimen from Florida collected in Sante Fe River, above Poe Springs, Alachua County.

(VII) *Carterius* POTTS

Gemmules possess a long foraminal tube which carries long filaments. Skeletal spicules usually microspined. Dermal spicules slender, long, entirely spined. Gemmule spicules birotulates of one class; usually spiny.

Only one sponge probably belonging to this genus is known from Florida. An immature specimen resembling *C. tubisperma* Mills was collected in 1945 in Alachua County, by M. C. Johnson.

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